

Attorney Docket: 6550-000013
Serial No. 09/114,665

C₁
1. A method for producing an *in-situ* composite solder having particulate reinforcements of an intermetallic compound comprising the steps of:

- a) combining a solder with the components of the intermetallic compound to form a mixture;
- b) heating the mixture of step a) to a temperature greater than the highest melting temperature of any of the individual components of the intermetallic phase to form a non-solid;
- c) rapidly cooling the mixture of step b) at a rate of at least about 100 °C/sec.

C₂
7. The method of Claim 1 where the components of the intermetallic compound comprise about 20 volume % of the composite solder.

8. The method of Claim 1 where the intermetallic compound comprises one of the elements of the eutectic solder and a transition metal.

9. The method of Claim 1 where the intermetallic compound comprises Cu₆Sn₅.

10. The method of Claim 1 where the intermetallic compound comprises Ni₃Sn₄.

11. The method of Claim 1 where the intermetallic compound comprises FeSn₂.

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16. A method for producing an *in-situ* composite solder having particulate reinforcements of an intermetallic compound comprising the steps of

- C3
- a) combining a solder with the components of the intermetallic compound to form a mixture;
 - b) heating the mixture of step a) to form a non-solid;
 - c) cooling the non-solid mixture of step b) to form a solid;
 - d) heating the solid of step c) to form a non-solid; and
 - e) rapidly cooling the mixture of step d).

C4
20. A method for producing an *in-situ* composite solder having particulate reinforcements of an intermetallic compound comprising the steps of:

- a) combining a solder with the components of the intermetallic compound to form a mixture;
- b) heating the mixture of step a) to form a non-solid;
- c) cooling the mixture of step b) to form a solid;
- d) reheating the mixture of step c) to form a non-solid; and
- e) rapidly cooling the mixture of step d) at a rate of at least about 100 °C/sec.

C5
22. The method of Claim 20 where the components of the intermetallic compound comprise about 20 volume % of the composite solder.

23. The method of Claim 20 where the intermetallic compound comprises one of the elements of the eutectic solder and a transition metal.

24. The method of Claim 20 where the mixture is reheated to a temperature greater than the melting point of the intermetallic compound.